BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division **INDUSTRIAL HYGIENE GROUP** Standard Operating Procedure: Field Procedure	NUMBER **IH75180** REVISION **FINAL Rev 4**
Atmospheric Testing with # Direct Reading Instruments	DATE **08/24/05** PAGE **1** OF 12

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1.0 Purpose & Scope

This document describes a generic policy to follow for airborne contaminant sampling with direct reading meters. For specific instructions on the operation of a particular piece of equipment to measure a particular contaminant, refer to the SHSD IH Group SOP for each meter.

The goal of the procedure is to provide a uniform methodology to measure chemical vapor, fumes, mists or particulates. Using this method will ensure repeatability between various sampling personnel and ensure that all pertinent data will be captured at the time of sampling.

This procedure has limited appropriateness for OSHA occupational exposure limit (OEL) compliance testing and is valid for OEL monitoring only when the sampling instrument has been calibrated for the particular contaminant. An area survey meter should be used to determine general exposure levels. Survey meters are designed for conducting surveys to locate problem sources and measuring the effectiveness of engineering controls. It can be used as a screening tool to determine the need for personal monitoring. However, employee exposure assessments for occupational exposure compliance should be made with a personal, breathing zone sample collected on sorbent/filter/impingers or with personal logging meters. An area survey meter can be used in limited situations for employee exposure assessments, such as for operations that are of short duration (15 to 30 minutes) that involve limited employee movement so that the meter

can measure the actual employee exposure. In these cases, the meter reading must be observed and recorded over the entire time of exposure.

2.0 Responsibilities

2.1 This procedure is administered through the SHSD Industrial Hygiene Group. Members of the SHSD Industrial Hygiene Group are required to follow this procedure.

2.2 Other BNL organizations that provide BNL with field monitoring or other hazard assessment services are required to follow this SOP or an equivalent document that ensures an equal or superior method of assessment documentation and recordkeeping.

2.3 ***Industrial Hygiene Professional:*** The *Industrial Hygiene Professional* of SHSD and other BNL organizations are to be qualified by their supervision. These individuals will conduct or supervise industrial hygiene hazard assessments and personal exposure monitoring using this procedure. These *IH Professionals* are responsible for:

- Interpreting, reporting, and documenting personal exposure monitoring in accordance with the requirements of this procedure, other appropriate SOPs, and generally accepted professional standards and practices.
- Ensuring a quality report is prepared that documents the exposure, evaluates the relevance to exposure standards, and recommends protective and corrective actions.
- Ensuring the final report is provided in a timely manner to all appropriate parties.
- Ensuring that the appropriate data is correctly and completely entered into the BNL IH exposure monitoring database (i.e. *Compliance Suite*®).
- Ensuring that original records of sampling and analysis enter the SHSD *Record Custodian* filing system.

2.4 ***Industrial Hygiene Technician (Sampler)*:** The industrial hygiene technician is to be qualified by their supervision to conduct industrial hygiene personal exposure monitoring under the direction of his/her organization's *IH Professional.* The sampler is responsible for collecting personal exposure monitoring samples in accordance with the guidance of the *IH Professional* and the requirements of all SOP's pertinent to the particular monitoring requirements (i.e. Chain of custody, equipment check in/out, equipment operation, recordkeeping, etc.).

2.5 ***Compliance Suite® data entry:*** The management of the person conducting the sampling is responsible for entering complete and correct data into the BNL IH exposure monitoring database (i.e. *Compliance Suite*). This task may be assigned to one or more individuals who act as the data entry person for an organization, however, it remains the responsibility of the line management of the *Sampler* to ensure this task is fulfilled within 10 business days of the end of the sampling event.

2.6 **Chain of Custody procedures:** The collector of the sample is responsible for the integrity of data record sheets until it has been properly transferred to the IH Group.

2.7 **Hazard Analysis of the Sampling Task:** It is the responsibility of the person using this method and his/her supervisor to ensure that the appropriate personal protective equipment is worn while performing this procedure. In addition, the person performing this procedure and his/her supervisor are responsible to ensure that all required training and qualification for hazards that may be present in areas where this procedure will be used (such as respiratory protection or radiation contamination) have been met. The person performing this procedure and his/her line supervisor are responsible to comply with all work planning and work permit system requirements.

3.0 Definitions

Direct Reading Instrument: An analytical meter capable of instantaneous or near instantaneous detection of the presence and concentration of an airborne contaminant. Examples would be combustible and toxic gas meters, photoionization detectors, gas chromatographs, and infrared analyzers.

Program Administrator: A person designated by the IH Group Leader or SHSD management to administer this procedure and the associated program of air sampling data management.

Qualified Sampler*:* A person who has demonstrated competency as per Section 7.

4.0 Prerequisites

4.1 **Area Access**:

4.2.1 Contact the appropriate Facility Support Representative or Technician to obtain approval to enter radiological areas.

4.2.2 Verify with the appropriate Facility Support Representative or Technician if a Work Permit or Radiological Work Permit is needed or is in effect. If so, review and sign the permit.

4.2.3 Use appropriate PPE for area.

5.0 Precautions

5.1 **Hazard assessment of area:** The actual task of using a direct reading meter typically does not pose significant employee health risks. The operation of an area survey meter or use of this procedure does not cause exposure to any chemical, physical, or radiological hazards.

Some meters (XRF, FAM, GC-ECD) have hazard sources within the meters that can harm the users in exposed to. This SOP does not authorize any worker to open the meter housing on any IH meter. Return the meter immediately if the housing is found damaged or is damaged during use.

But by its very nature, this SOP may be performed in areas with chemical or radiation contamination, and these hazards must be assessed on a case-by-case basis. No one is to perform sampling until a competent individual knowledgeable of the hazards of the area has assessed the hazards of the area.

5.2 **Personal Protective Equipment:** Appropriate personal protective equipment to protect the person collecting the sample must be used when implementing this procedure.

5.2.1 Where the potential for contamination of the body can occur, the use of disposable clothing to cover the areas of contact is required.

Hand: Use of a meter in areas of known or suspected chemical or radiological contamination requires the use of disposable gloves. Exam-style, splash gloves are acceptable. Acceptable elastomers are: Nitrile, PVC, and Natural Rubber.

Body: If contact of the body with contaminated surfaces is anticipated, a disposable suit should be used. Acceptable CPC materials include: Tyvek®, KleenGuard®, and cotton. Disposable garments must be discarded as mercury

waste if contact with contamination has occurred. If personal clothing items become contaminated, they must be surrendered for BNL cleaning or disposal.

Foot: If contact of the feet is anticipated with contaminated surfaces, disposable shoe coverings, boots or booties should be used. Acceptable CPC material include: Tyvek®, KleenGuard®, and rubber. If personal shoes become contaminated, they must be surrendered for BNL cleaning or disposal.

Respiratory: Under normal use, respiratory protection is not required. If chemical or radiological levels from contamination in the area exceed (as indicated by the direct reading meter) or are likely to exceed the OSHA, ACGIH, or DOE standards, respirators are required. A half face or full face APR or PAPR respirator with appropriate cartridge or an air line respirator may be used up to the assigned protection factor listed in the BNL's Respiratory Protection Selection and Issuance SOPs.

Eye: Safety Glasses with side shields are required in all laboratories, construction, and general industry work areas.

5.3 **Work Planning:** All requirements of work permits and work planning system reviews must be met in performing this procedure.

5.4 **Environmental Impact and Waste Disposal:** These types of instruments do not have adverse impact on the environment or create waste for disposal.

5.5 **Job Risk Assessment:** Consult the *Job Risk Assessment* IH-JRA-05 for field sampling on the SHSD OHSAS 18001 web site.

6.0 Procedure

6.1 **Equipment- Direct Reading Meter** (this SOP is applicable for many instruments with operating instruction SOPs written in Section IH75nnn of the SHSD IH Group SOPs. Contact an IH Group professional Industrial Hygienist or other competent individual for assistance in selecting the appropriate meter for analysis of an airborne contaminant.

6.2 **Sampling Technique:** Determining the NUMBER and LOCATION of samples varies on a case-by-case basis. Professional judgment is needed in determining the sampling parameters based on factors such as the size of the area to be tested, the predicted

uniformity of contamination within the area, and relative hazard of the contaminant, and the accuracy, precision (repeatability), and sensitivity of the instrument. It is appropriate to take samples in:

- areas where workers predominately spend time or frequently access,
- at sources of the contamination (such as process equipment & lab apparatus),
- areas where contamination is not expected (serves as a control), and
- areas where contamination would not be permissible (such as lunch rooms and offices).

6.3 **Signing out Meter:**

6.3.1 Prior to the sampling day, contact the IH Group Laboratory via the SHSD Equipment Request web page. Follow IH51500 for the procedure to obtain the meter.

6.3.2 The IH Lab meters are intended for short duration use (i.e. one day). You may contact the IH Group for assistance in locating suitable rental equipment for extended monitoring projects. Equipment is due back by 9:00 a.m. the following day unless other provisions are made with the IH *Equipment Custodian*. Only by special agreement with the IH Lab *Equipment Custodian* can a meter be kept out for longer periods.

6.4 **Preliminary check of the meter:** Check the meter for a calibration sticker. Do not use the meter if a calibration sticker is not present, or if the date on a calibration sticker indicates that the meter's calibration has expired. If applicable, BUMP TEST the meter with a sample of the compound to verify that the meter is operating correctly.

6.5 **Recording Readings:**

6.5.1 Plan and conduct hazard assessments and exposure monitoring using the procedure outlined in I*H 60500 Planning Sampling & Reporting Personnel Exposure Monitoring Results* for:

- Exposure Assessment Sampling Strategy,
- Initial Notification of Employee Monitoring Results, and
- Preparation of a formal report on the exposure monitoring or hazard assessment.

6.5.2 Use a BNL *Direct Reading Instrument* form (Attachment 9.2) to record readings.

6.5.3 Add a sketch the the Sampling form or attach a photo of the sample area. The sketch or photo should clearly identify the location of the hazard source, worker and by-stander locations, and sample location(s).

6.5.4 Some meters can log data. Whenever possible, use this feature and print a hardcopy of the data and supply it to the IH Laboratory.

6.5.5 Return meter and original *Direct Reading Instrument* form to the SHSD IH Laboratory.

6.5.6 The IH Group will maintain a copy of sampling results for at least 75 years.

6.6 **Results interpretation:**

6.6.1 A qualified IH professional should write a hazard evaluation report that evaluates the survey data and summarizes the potential for occupational exposure and compliance with OSHA and ACGIH Occupational Exposure Limits. Notify workers of sampling results as per IH60500.

6.6.2 Ensure that a copy of the hazard evaluation report is sent to the IH Laboratory and is submitted in the ESHQ Directorate Recordkeeping system.

6.6.3 Ensure that a copy of the written hazard evaluation report is sent to the Occupational Medicine Clinic with the worker(s) BNL Life Number(s) noted.

6.6.4 Complete an entry in the BNL IH Exposure Monitoring Database (*Compliance Suite*) and submit hardcopies of the entry to the IH Laboratory.

7.0 Implementation and Training

Prior to using this procedure, the user:

7.1 Demonstrates proper operation of this instrument to the satisfaction of line supervision.

7.2 Completes other appropriate training for the area to be entered (check with ESH coordinator or FS representative for the facility). Completes OT&Q Training and a medical surveillance required for any PPE used on the job or for other hazards encountered in the work area.

7.3 Personnel of SHSD are to document their training using the Attachment 9.1 with its *Job Performance Measure Completion Certificate* and complete qualification on this procedure on at least a 3 year basis

8.0 References

none

9.0 Attachments

9.1 SHSD IHG Qualification Record

9.2 Direct Reading Instrument Survey Form

10.0 Documentation

Document Development and Revision Control Tracking		
Prepared By: *(Signature and date on file)* **R. Selvey 03/15/01**	Technical Reviewed By / Date: *(Signature and date on file)* **J. Peters 03/16/01**	SHSD Approved By / Date: *(Signature and date on file)* **R. Selvey 03/15/01** IH Group Leader
ESH Coordinator/ Date: *none*	Work Coordinator/ Date: *none*	SHSD Manager / Date *none*
QA Representative / Date: *none*	Training Coordinator / Date: *none*	Filing Code: **IH52.05**
Facility Support Rep. / Date: *(Signature and date on file)* **N. Foster 04/12/01** RCD Facility Support Procedure Committee Review **04/10/01**	Environ. Compliance Rep. / Date: *none*	Effective Date: **03/02/2000**
ISM Review - Hazard Categorization ☐ High ☒ Moderate ☐ Low/Skill of the craft	Validation: ☐ Formal Walkthrough ☐ Desk Top Review ☐ SME Review Name / Date:	IMPLEMENTATION: Training Completed:08/18/05 + Procedure posted on Web: 08/24/05 Hard Copy files updated: 08/24/05

Revision Log		
04/11/01	*(Signature and date on file)* R. Selvey	Revised to include RCD Facility Support Procedure Committee Review comments.

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03/30/05	*(Signature and date on file)* R. Selvey	Revised to include Section 7 Implementation and Training. Text was added to Section 2, 4,5, 6, and 7. JRA added to Section 5.

Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☒ Clarify/enhance procedural controls

Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☐ none of the above

Section/page and Description of change: Minor change of JPM number to Attachment 9.1 to match new JTA codes.

R. Selvey 08/18/05 *(signature/date on file)* SME Reviewer/Date:	Reviewer/Date:	*R. Selvey 08/18/05* *(signature/date on file)* Approver/Date:

Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☒ Clarify/enhance procedural controls

Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above **Changes were made based on worker comments during qualification training.**

Section/page and Description of change: Section 5 had precautions added to not open the meter housing and mini-JRA was eliminated. Section 6 had minor change in 6.3.2 for clarity, addition of requirement to bump test, and addition of a requirement to add sketch or photo.

R. Selvey 08/24/05 *(signature/date on file)* SME Reviewer/Date:	Reviewer/Date:	*R. Selvey 08/24/05* *(signature/date on file)* Approver/Date:

BROOKHAVEN NATIONAL LABORATORY

IH75180 Attachment 9.1
HP-IHP-75180

Safety and Health Services Division - Industrial Hygiene Group

Direct Reading Instruments Qualification

Qualification Criteria: Only persons of the Industrial Hygiene Group who have demonstrated competency in SHSD IHG SOP IH75180 to the satisfaction of the IH Group Leader, Exposure Monitoring Program Administrator, or designee are authorized and allowed to receive samples.
Personnel shall be re-qualified at a frequency not to exceed three years. **For SHSD:** The qualification criteria to perform this procedure for SHSD includes demonstrated competency to the satisfaction of the IH Group Leader or IHG Exposure Monitoring Program Administrator in the following areas:

- Knowledge of industrial hygiene practice (awareness level).
- Specific knowledge of this procedure.
- Demonstrated competency in performing this type of testing.

Name	BNL#	Date of Qualification
Qualified By:	Qualifiers Title: *SHSD IH Group Leader*	Qualification Number: **HP-IHP-75180**

Topic	Criteria	Qualification Status
Hazard Analysis	*Sampler* can show how to perform (or who to request to perform) the hazard analysis of the sampling area and potential exposure to the sampler.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**
Personal Protective Equipment	*Sampler* understands the need to be aware of the potential surface contamination and airborne levels of contaminants and knows how to determine the need for PPE and how to obtain the correct PPE for the hazard.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**
Sampling Equipment	*Sampler* can show where equipment needed for the procedure is located and how to properly sign it out.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**
Sampling Protocol	*Sampler* understands the exposure monitoring logic necessary to appropriately select sampling locations to accurately measure worker, public and environmental exposure potential.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**
Record forms	*Sampler* can show where Direct Reading Instrument Record forms are located and how to correctly and completely fill them out.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**
Analysis of data	*Sampler* can show how to perform (or who to request to perform) the data analysis on the sampling data to access potential exposure to the sampler, worker, public and environment.	☐ **Satisfactory** ☐ **Corrected** ☐ **Not Qualified**

BROOKHAVEN NATIONAL LABORATORY **DIRECT READING INSTRUMENT**

ENVIRONMENTAL, SAFETY, HEALTH & QUALITY DIRECTORATE - IH Services

DATE:	SURVEYOR(S):

I. AREA INFORMATION

DEPT:	BLDG:	ROOM:
SOURCE:		
ENGINEERING CONTROLS:		

II. EMPLOYEE INFORMATION

FIRST NAME:	LAST NAME:	BNL #:
DEPT:	BLDG:	JOB TITLE:
EXPOSURE DURATION (HRS):	EXPOSURE (TIMES PER DAY):	EXPOSURE (DAYS PER YR):
JOB/TASK PERFORMED:		
PPE USED:		

III. SURVEY INSTRUMENT INFORMATION

INSTRUMENT:	MODEL:	SERIAL#:
FACTORY CALIBRATION DATE:	PRE-CAL: BY:	POST CAL: BY:

IV. SAMPLING INFORMATION & RESULTS

HAZARD	UNITS:	CORRECTION FACTOR:

TIME	LOCATION	READING	COMMENTS

_____ Additional monitoring data on page 2

V. CONCLUSIONS & RECOMMENDATIONS

Return completed form to: IH Lab, Building 129A FILE CODE: IH75SR. FORM IH75180 (03/01)

TIME	LOCATION	READING	COMMENTS